DOCUMENT RESUME

ED 049 753 JC 710 131

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TITLE Instructional Objectives for a Junior College Course in Introduction to Physiology.
INSTITUTION California Univ., Los Angeles. ERIC Clearinghouse for Junior Coll. Information.
PUB DATE Jun 71
NOTE 19p.

EDRS PRICE EDRS Price MF-$0.65 HC-$3.29
DESCRIPTORS *Anatomy, *Behavioral Objectives, *Junior Colleges, *Physiology

ABSTRACT

These instructional objectives have been selected from materials submitted to the Curriculum Laboratory of the Graduate School of Education at UCLA. Arranged by major course goals, these objectives are offered simply as samples that may be used where they correspond to the skills, abilities, and attitudes instructors want their students to acquire. These objectives may also serve as models for assisting instructors to translate other instructional units into specific measurable terms. For other objectives in a related course see: ED 033 711 (Physiology [First Semester]). (MB)

ED049753

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Instructional Objectives for a Junior College Course in Introduction to Physiology

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ERIC Clearinghouse for Junior Colleges
University of California
Los Angeles, California

June 1971

JC 710 131

UNIVERSITY OF CALIF.
LOS ANGELES

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INTRODUCTION TO PHYSIOLOGY

UNIT ONE: STRUCTURAL ORGANIZATION OF THE WHOLE BODY.

Fundamental to an under_standing of the integration of body processes is a knowledge of the structural organization of the human body and the normal functioning of these structures.

I. Goal:

The student will know the names and anatomical characteristics of the human body cavities.

Objective:

1. Given a list of body cavities, the student will state whether it is dorsal or ventral, and name organs found there. Exam conditions. 75

II. Goal:

The student will understand the individual functions and interrelated functions of the nine body systems.

Objective:

2. Given 20 minutes under exam conditions, the student will select the physiological function which most likely is performed by a particular system. Twenty multiple choice questions. 80

3. Outside of class, the student will write a paper of 350-600 words describing the integration of body systems. The paper will include examples of how body systems work together to maintain a smooth functioning organism. 100

4. The student will write a paragraph defining an organ. Also included will be three examples of an organ and reasons why they are so classified. 20 minutes in class without notes will be given. 100

III. Goal:

The student will understand the definition, location and functions of tissues.

Objective:

5. The student will state in writing two characteristics held in common and two which differentiate tissue from organs. 75

6. Given a list of various types of tissue, the student will match tissue with organ in which it is most likely to be found. 60

7. Using the microscope, at both high and low power, the student will identify correctly, histological section being viewed. 60

UNIT TWO: THE CELL.

Prerequisite to the study of gross physiological and anatomical functions, is the study of the cell. Not only examining the cell's structure and morphology, but understanding of the cellular mechanisms responsible for obtaining and using energy, for reproduction and for transport of materials will be stressed.

I. Goal:
The student will understnad the theory of cells, and tools and techniques of cytology.

Objective:
1. The student will write the cell theory as postulated by Schwann and Schleiden. 100

2. The student will list seven steps in mounting and preparing any slide for viewing under the microscope. 60

II. Goal:
The student will understand the basic organization of the cell and the functions of its component parts.

Objective:
3. The student will diagram and label a typical animal cell as would be seen with an electron microscope. Drawing will be done during lab section and is to include: cell membrane, cytoplasm, nucleus, nucleolus, mitochondria, nuclear membrane, endoplasmic reticulum, lysosomes, vacuole, Golgi complex, lipid droplets and glycogen granules. References permitted. 100

4. The student will list the five basic substances which make protoplasm. 80

5. The student will match physiological function with cellular structure from a list of ten functions. 70

III. Goal:
The student will understand cell division and cell differentiation.

6. The student will, outside of class, define and describe the function of the following, as they relate to cell reproduction: DNA, RNA, gene, chromosome, centriole, spindle and mitosis. 100

7. Under exam conditions, the student will identify six of ten microscopic slides showing mitosis. The student will name the phase of mitosis and the specific structure indicated by pointer.

8. The student will demonstrate his knowledge of cell differentiation by discriminating between various cell types and tissue slices in the lab. 70

UNIT THREE: SKELETAL AND MUSCULAR SYSTEMS.

Together, the skeletal and muscular systems provide the organism with support, protection, and movement, which makes it possible for the body to adjust to changes of the internal and external environment. Emphasis will be placed in this unit on the integrated action of the muscles and skeleton.

I. Goal:
The student will understand the protective and/or supportive function of bone and structures common to all bones.

Objective:
1. Given a list of bone structures the student will describe the function of each. 70

2. Outside of class, the student will write a paragraph of less than 150 words on bone marrow. Included will be a description of all types and at least three general functions of marrow. 100

II. Goal:
The student will understand that bone is a dynamic tissue through study of bone growth and development.

Objective:
3. The student will differentiate in writing the following pairs of terms: ossified-cartilaginous; intramembranous-intracartilaginous; epiphysis-diaphysis. 65

III. Goal:
The student will comprehend joints or articulations, and associated structures.

Objective:
4. Given the three classes of joints (synarthroses, anphiarthroses and diathroses), the student will group from a list of specific joints or bones those which correlate most closely under each class. 60

5. The student will describe the function of the following structures as they relate to joints: synovial fluid, synovial membrane, tendons, ligaments, fascia and cartilage. 65

IV. Goal:
The student will know three muscle types and general physiological characteristics of all muscle.

Objective:
6. The student will write three anatomical and/or physiological characteristics of each o the three types of muscle which distinguish it from the other two. 80

7. Outside of class the student will write a paper of 300-600 words on physiological characteristics of muscle tissue. The paper must include a brief description of irritability, contractility, extensibility and elasticity as they relate to muscle. 100

8. Outside of class, the student will diagram a skeletal muscle sarcomere as it would appear under an electron microscope. All zones and lincs should be labeled. 100

9. The student will sketch on a graph, the following skeletal muscle responses: twitch, summation, tetani, fatigue, and treppe. 80

10. The student will differentiate and define the following pairs of terms: isotonic-isometric; twitch-tone; exercise-work; levers-EDV; aerobic-anaerobic. 80

11. The student will, in writing, ascribe the role of the following in muscle contraction: ATP, ADP, Ca^{++}, CP, troponin, myosin, actin, T*system, and sarcoplasmic reticulum. 80

UNIT FOUR: THE NERVOUS SYSTEM.

Body processes are integrated and coordinated by the chemical composition of fluids and by the nervous systems. In this unit, concepts are developed which will enable students to gain an insight into the regulatory mechanisms of the nervous system.

I. Goal:
The student will understand the ionic and electrical phenomena of nervous tissue as they relate to anatomy and function.

Objective:
1. The student will diagram and label, in class, with the aid of references and slides, a typical motor neuron with a myelinated axon. 100

2. The student will write one sentence functional definitions to the following terms: axon, dendrite, myelin, synapse, neuron, neuroglia, impulse, conduction. 75

3. The student will illustrate by-means-of a diagram, the action potential of a nerve in response to electrical stimulation. 100

4. The student will write a paragraph of not more than 150 words describing how the "all or none" principleapplies in both nerve and muscle tissue. The paper is to be written outside of class and should include 3 points of similarity and 2 differences in the two types of tissue. 100

Objective:

5. The student will write the ionic basis of resting membrane potential, pointing out the ions envolved and the physical method by which they are transported accross the cell membrane. The essay will be written in 30 minutes under exam conditions. 80

6. The student will demonstrate his understanding of action potential by graphing the ionic movement and electrical activity of an axon following stimulation. Graph should be labeled, as discussed in class. 80

II. Goal:

The student will know the structure and function of the central and peripheral nervous systems.

Objective:

7. The student will write an essay describing the 3 major levels of nervous system function. The location and type of responses seen at each level should be included. The paper will be 400-600 words in length and will be written in class under exam conditions. 80

8. The student will diagram the cross section of the spinal cord and on his drawing show with lines a nd arrows a simple reflex. 100

9. The student will differentiate functionally in writing between the following pairs of terms, noting at least one similarity and one difference: gray and white matter; ascending and descending tracts; afferent and efferent nerves. 80

10. Given a list of parts of the human brain, the student will describe the location, structure and three functions of each. The description may be by means of a diagram or in writing. 70

11. The student will list seven differences in the central and autonomic nervous systems. 100

12. The student will name and distinguish between the two main divisions of the autonomic nervous system on the basis of origin and neuro-anatomy. Also three examples of antagonistic functions and two similar functions will be required. 80

III. Goal:

The student will be aware of the snesory systems of the human organism.

Objective:

13. The student will indicate from a list of senses, those which are somatic and those which are special. 80

14. Each student will give a fifteen minute oral report on one of the following senses: pain, thermreceptive, touch, sight, hearing, taste or equilibrium. Each report should include an explanation of the structures, functions, receptors, sensory pathway and neural center of that sense. Notes may be used during talk. 100

UNIT FIVE: THE CIRCULATORY SYSTEM

The phenomenon of homeostasis is primarily acco mplished through the collective action of the liquid tissues. The principal mechanisms by which plasma, lymph, tissue fluid, and the formed elements function in maintaining the body's internal environment are stressed.

I. Goal:
The student will know the main components of blood and their functions.

Objective:
1. Through examination of microscopic slides the student will identify in writing the blood cell seen, one to three functions, its sight of formation and two causes of its variation in number. 60

2. In lab the student will type his blood and submit a written report of not more than 150 words identifying the procedure used, the results and donor acceptor characteristics of his type. 100

3. The student will list the four main compounds necessary for the formation of a blood clot and will define and differentiate the following: clotting-agglutination; and antibody-antigen. 75

II. Goal:
The student will understand the physiological functions of the heart.

4. The student will trace the transmission of the cardiac impulse through the heart by means of a diagram. The diagram should show SA node, AV node, right

and left atria, right and left ventricle, bundle of His, bundle branch and Purkinje fibers. 70

5. The student will draw and label a heart beat as seen on an EKG and correlate it with phases of muscle contraction (diastole and systole). 80

6. From a list of ten terms regarding the heart, the student will define in writting six correctly. 60

7. The student will write an essay of not more than 300 words describing the three main factors which influence heart rate and the two which effect cardiac output. 80

III. Goal:

The student will comprehend the basic structure and functions of blood vessels and the vascular blood system.

Objective:

8. The student will characterize in writing arteries, veins, and capillaries with respect to elasticity, total volume, velocity of blood flow and vessel wall. 70

9. The student will d efine diastolic, septolic and pulse pressure and list the three main mechanisms of control and three causes of abnormal arterial press. 70

UNIT SIX: THE RESPIRATORY SYSTEM

The maintaining of cell functions and of life is dependent upon the continuous supply of oxygen to the tissues and the excretion of carbon dioxide by the body. This exchange of oxygen and carbon dioxide between the organism and the environment is the function of the respiratory system.

I. Goal:
The student will understand the anatomical structures of the respiratory system and their physiological functions.

Objective:
1. The student will label a diagram of a thoracic cavity of a human. 80
2. The student will list the four main functions of respiration. 100
3. The student will explain in writing the mechanics of breathing noting muscles and air content of both expiration and inspiration. 100
4. The student will list six chemical or neural factors which effect respiratory rate. The student will also write the mechanisms by which one of each type exerts its effect. 80
5. The student will define and differentiate in writing the following; inspired and expired air; tidal air and supplemental air; and external and internal respirations. 75.

UNIT SEVEN: DIGESTION AND METABOLISM

Maintenance of the living state is dependent upon the ability of the digestive system to hydrolyze foods into molecules which can be utilized by the cells.

I. Goal:
The student will know the parts of the alimentary canal and their role in digestion and absorption of food stuffs.

Objective:
1. The student will diagram and label the parts of the alimentary canal citing a major function of each part. 80
2. Given a list of enzymes, the student will match the enzyme with the area in which it is secreted, the gland or cells from which it comes and the class of food on which it acts. 70

II. Goal:
The students will know the location and the primary functions of the pancreas, liver and gall bladder.

Objective:
3. The student will label a diagram of the abdominal cavity.
4. The student will write the two secretions of the pancreas and cite a function of each. The region from which each comes and existance of hormonal control should also be noted. 80
5. The student will answer in writing fifteen of twenty multiple choice questions on the histology,

secretions, and functions of the liver and gall bladder. 75

III. Goal:
The student will understand metabloism and its measurement.

Objective:
6. The student will define the following in writing: metabolism, anabolism, catabolism, calories, BMR and respiratory quotient/ 100

7. The student will list four conditions necessary for the measurement of BMR and five factors which effect the rate of metabolism. Criteria is 7 of 9.

UNIT EIGHT: THE EXCRETORY SYSTEM.

The kidney functions to maintain a constancy of the internal environment of regulating the concentration of chemical substances in the blood and body fluids. Emphasis here will be on the interrelationship of structure and function and the processes by which the kidneys remove wastes and conserve substances useful to the body.

I. Goal:

The student will understand the methods by which the kidneys regulate the concentration of chemical substances in blood and body fluids.

Objective:

1. The student will write one paragraph on each of the kidneys' following functions: (1) acid-base balance; (2) water balance; (3) osmotic equilibrium and ionic balance. 75

2. The student will select from a list of 20 organic and inorganic substances those found in normal urine. 70

3. The student will write not more than 25 words describing each of the following functions of the nephron unit: filtration, reabsorption, and excretion. 100

UNIT NINE: THE ENDOCRINE SYSTEM.

As with the nervous system, the endocrine system is important in the integration and coordination of body processes. Emphasis in the study of the ductless glands is on the importance of endocrine balance.

I. Goal:

The student will know the locations, hormones and functions of the endocrine glands.

Objective:

1. The student will write the location, all hormones and two functions of 7 of 10 endocrine glands listed.

2. Given a list of hormones, the student will match with it relevant controls and the target organs of each. 75

3. Given a pathological state, the student will cite in writing whether it results from a hyposecretory or hypersecretory state and what gland is envolved. 60

UNIT TEN: REPRODUCTION.

The ability of an organism to reproduce itself in its own distinctive form is a fundamental characteristic of life. This biological phenomenon implies that exact duplication occurs at three successive levels--molecular, cellular and organismic.

I. Goal:
The student will understand the methods of reproduction in representative organisms.

Objective:
1. Given a list of unicellular and multicellular organisms the student will write whether it reproduces by vegetative, sporulative or gametic methods, and whether sexes are separate or hermaphroditic. 60
2. The student will define correctly 10 of 15 terms dealing with human reproduction.
3. The student will write three functions of the testes and two of the ovaries. 100